

ing event at ~3.95 b.y. through which some radiogenic Ar survived (Hinthorne and Conrad, 1976).

Exposure age: Ar: 78503,6,7, 332±22 m.y.; 2-4-mm "recrystallized anorthosite" fragment (Schaeffer and others, 1976).

Sample 78525-28, 30, 35-39, 45-49, 55-59, 65-69, 75-79, 85-89, 95-99

Type: 39 rock fragments, with some associated sediment (78530) from rake sample; 78525,26, sedimentary, weakly lithified polymict breccia; 78527, norite (?); 78528, basalt; 78530, sedimentary, unconsolidated; 78535-39, 45-49, 55-59, 65-68, sedimentary, weakly lithified polymict breccia; 78569, 75-79, 85-89, 95-99, basalt.

Size: Rock fragments, largest is less than 6 cm long.

Weight: 78530, 88.92 g; 78525-28, 35-39, 45-49, 55-59, 65-69, 75-79, 85-89, 95-99, 1,355.94 g total.

Depth: Raked from upper few centimeters.

Location: Near rim of 15 m crater about 20 m northwest of the LRV.

Illustrations: Pans 25, 26; figure 221.

Comments: Except for norite (?) fragment 78527, which is similar in chemical composition to the fused part of norite 78235, all rake fragments are basalt or weakly lithified polymict breccia derived from regolith material.

Petrographic descriptions:

78527, norite (?) partly glass coated, fractured; 75 percent plagioclase (maskelynite?), 25 percent

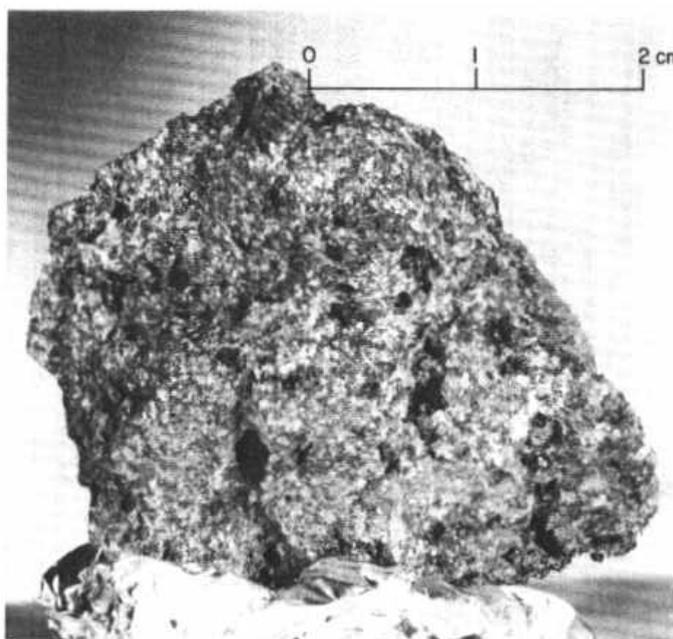


FIGURE 220.-Sample 78507. Medium-grained olivine basalt. (NASA photograph S-73-16144.)

cent orthopyroxene (?).

78528, fine-grained basalt.

78525, 26; 78535-38; 78545, 46, polymict breccia. Matrix coherent, vitreous.

78547-49; 78555-57; 78567, polymict breccia with fine-grained friable matrix.

78569, fine-grained basalt with an interrelate (?) groundmass.

78575, fine-grained olivine basalt.

78576, medium-grained vesicular basalt.

78577, medium-grained vesicular basalt.

78578, medium-grained vesicular basalt.

78579, medium-grained vesicular olivine basalt.

78585, no description.

78586, aphanitic basalt.

78587, aphanitic basalt.

78596, fine-grained basalt.

78597, fine-grained vesicular olivine basalt.

78598, fine-grained basalt.

78599, fine-grained basalt.

Major-element compositions:

Chemical analyses of station 8 rake fragments 78526, 78527, 78535, 78546, 78547, 78548, 78549, 78595, 78597, 78599

	1	2	3	4	5	6	7	8	9	10
SiO ₂	--	--	--	--	--	--	--	--	38.54	38.44
Al ₂ O ₃	11.1	16.8	17.2	15.3	16.3	16.0	18.0	9.0	8.85	8.67
FeO.....	17.4	7.4	11.3	13.2	11.8	13.2	11.4	19.9	19.67	19.14
MgO.....	11	15	9.7	10	11	10	10	9.1	7.83	8.47
CaO.....	10.0	9.2	11.6	11.0	11.1	11.3	11.9	11.0	10.94	10.48
Na ₂ O.....	.15	.42	.38	.45	.36	.41	.39	.387	.39	.38
K ₂ O.....	.020	.065	.090	.10	.085	.090	.10	.063	.04	.06
TiO ₂.....	.8	.6	3.9	4.2	2.2	5.2	2.6	12.8	12.39	12.52
P ₂ O ₅	--	--	--	--	--	--	--	--	.11	.04
MnO.....	.261	.090	.140	.160	.160	.167	.042	.253	.29	.28
Cr ₂ O ₃.....	.740	.210	.300	.330	.360	.340	.294	.443	.32	.43
Total									99.37	98.91

- 78526,1, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78527,2, norite (?)(Laul and Schmitt, (1975a).
- 78535,3, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78546,3, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78547,3, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78548,3, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78549,1, weakly lithified polymict breccia (Laul and Schmitt, (1975a).
- 78595,3, basalt (Warner and others, 1975a).
- 78597,4, basalt (Rhodes and others, 1976).
- 78599,3-2 basalt (Rhodes and others, 1976).

STATION 9

LOCATION

Station 9 is located on the southeast rim and on the ejecta blanket of Van Serg crater (fig. 7D).

OBJECTIVES

The objectives at station 9 were to determine the origin of Van Serg crater, to sample the dark mantle and subfloor materials, and to characterize the lithology and stratigraphy of the dark mantle.

GENERAL OBSERVATIONS

Van Serg crater is 90 m in diameter and has a blocky central mound about 30 m across, discontinuous benches on the inner walls, a raised blocky rim, and a blocky ejecta blanket. The older, subdued crater to the southeast is also about 90 m in diameter, has a much lower and smoother rim, and is covered with blocky ejecta from Van Serg. Craters younger than Van Serg are extremely rare in the station 9 area. A few small (<5 m) craters are present.

Exploration and sampling at station 9 was concentrated in two areas: (1) the southeast rim of Van Serg and (2) an area about 65 m to the southeast near the northeast rim of the subdued crater (fig. 222).

In both sample areas fragment sizes are up to about 30 cm, with a few larger boulders up to approximately 2 m in size. Fragments larger than 2 cm cover about 10 percent of the Van Serg rim crest but no more than 3 percent in the southeastern area. Blocks and fragments in both sampling areas are typically angular. Many are partially buried, but there is little or no development of fillets even on the steep inner walls of Van Serg crater.

Surface sediment is gray, uniformly fine, and has no visible linear patterns. The upper few centimeters is soft and compacts easily to preserve bootprints. A trench in the southeastern sample area exposed a 7-cm upper dark unit underlain by about 10 cm of light-gray sediment.

Samples from the southeast rim of Van Serg crater

consisted of three rocks picked up from the surface, two rocks chipped from a boulder, and two sediment samples with associated small rock fragments. Samples from the southeastern site consisted of a double drive tube, two rocks collected from the surface, and three samples from a trench.

GEOLOGIC DISCUSSION

Because the station 9 area is distinctly more blocky than the surrounding plains, we interpret it as lying entirely within the ejecta of Van Serg crater. The dominant rock type, as seen by the crew at station 9, as interpreted from lunar surface photographs, and as recorded in the sample collection, is dark friable polymict breccia that represents regolith material indurated and excavated by the Van Serg impact. The overwhelming abundance of such regolith breccia and the paucity of basalt blocks imply that subfloor basalt bedrock was not excavated in the formation of Van Serg.

Multiple topographic profiles, made by analytical stereoplotter on orbital Apollo 17 panoramic camera photographs, suggest that the floor of Van Serg is approximately 11 m below the precrater surface. Hence, we suggest that at least 11 m of unconsolidated material overlies the subfloor basalt in the station 9 area.

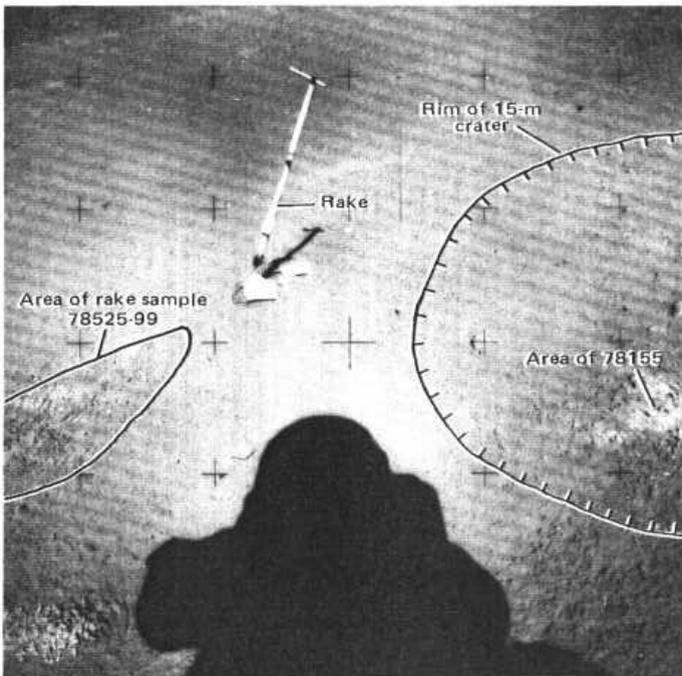


FIGURE 221.-Area of rake sample 78525-99. (NASA photograph AS17-142-21709.)

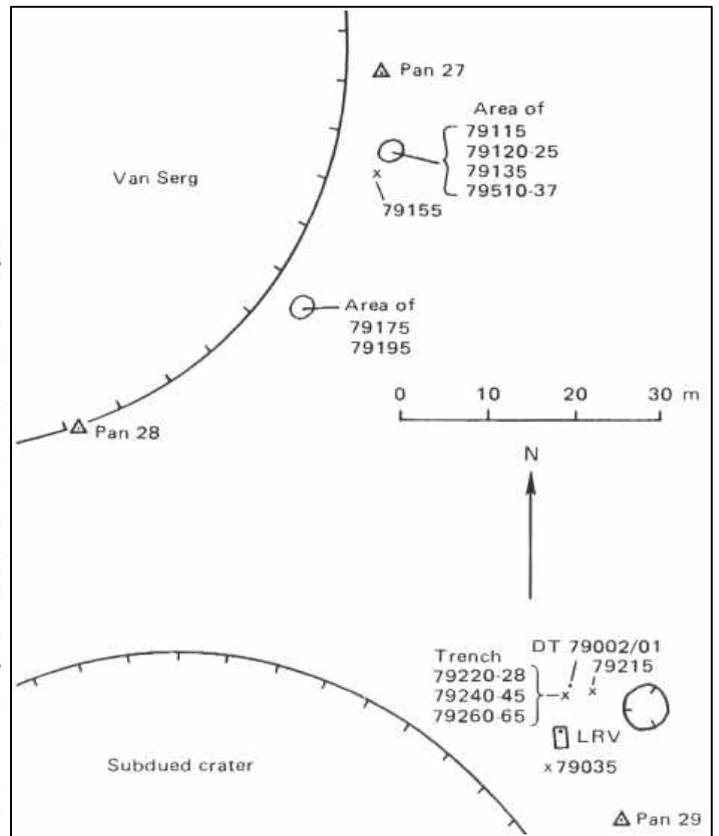


FIGURE 222.-Planimetric map of station 9.

similar in composition to the lower two-thirds of the deep core (LM/ALSEP/SEP area) and to the gray sediment from the Shorty crater (station 4) trench (fig. 223). We interpret these samples as representative of the older regolith of the valley floor, a unit formed by long-term mixing of impact-generated debris from the local highlands, from the subfloor basalt, and from the ash unit. It is likely that the slightly more basaltic character of regolith breccia sample 79035 (fig. 223) reflects local inhomogeneity in the Van Serg target.

Several lines of field evidence suggest that Van Serg crater is very young. These include (1) the abundance and angularity of the relatively friable blocks of regolith breccia, (2) the scarcity of younger craters, (3) the general absence of fillets even on the steep inner crater walls, and (4) the uneroded nature of the crater rim and central mound. Shorty crater, apparently

formed sometime between 10 and 30 m.y. ago, is probably older than Van Serg. Shorty lacks the abundant blocks of regolith breccia; its rim as seen in orbital photographs seems somewhat less sharp, and small craters may be slightly more abundant on the rim of Shorty.

Exposure age measurements for station 9 samples include an estimate of 24 m.y. determined from minimum track densities in mineral grains in the trench samples (Fleischer and Hart, 1974), 3.7 m.y. determined from tracks in rock 79215 from the southeastern sample area (Bhandari and others, 1976), and approximately 1.5 m.y. determined from ^{22}Na - ^{26}Al measurements in the trench samples (Yokoyama and others, 1976). By comparison with 10-30-m.y.-old Shorty crater, Van Serg's distinctly more youthful appearance suggests that the younger exposure ages (1.5 and 3.7

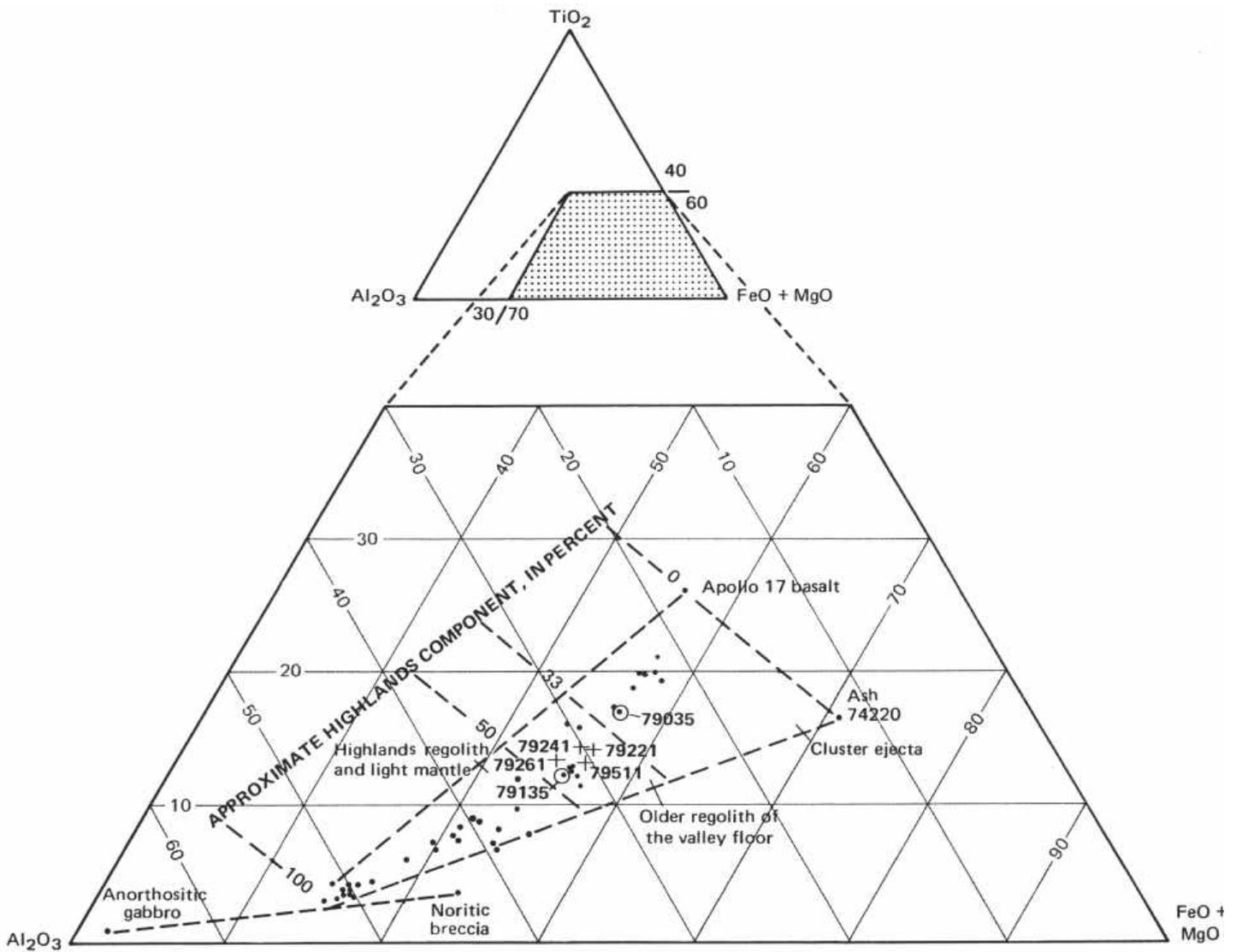


FIGURE 223.—Relative amounts of TiO_2 , Al_2O_3 , and $\text{FeO}+\text{MgO}$ in sediment samples (crosses) and in regolith breccia (circled dots) from station 9 in comparison with sediment samples from elsewhere in traverse region (dots). Apollo 17 basalt, anorthositic gabbro, and noritic breccia values from Rhodes and others (1974).

m.y.) may more nearly approximate the age of Van Serg crater.

SUMMARY OF SAMPLING

Sample 79002/79001 (upper/lower)

Type: Double drive tube.
Length: 51.7 cm (79001, 32.0 cm; 79002,19.7 cm).
Depth: Approximately 71 cm.
Net weight: 1,152.8 g.
Location: About 5 m north of the LRV.
Illustrations: Pans 28, 29; figure 224.
Comments: Drive tube 79001-02 is probably in ejecta from Van Serg crater.

Sample 79035

Type: Sedimentary, weakly lithified polymict breccia.
Size: Three large fragments: 19x14x10 cm, 15x10x6 cm, 15x6 x4.5 cm, and three smaller fragments.
Weight: 2,806 g total.
Location: A few meters from the LRV; precise location unknown.
Illustrations: Pans 28, 29; figure 225 (LRL).
Comments: Sample 79035 is a sample of indurated regolith material that may have been excavated by the Van Serg impact. Its composition (table; fig. 223) shows it to have more basalt than other analyzed sediment samples from station 9. However, the difference may reflect no more than local inhomogeneity of the regolith.
Petrographic description: Polymict breccia with small clasts of metaclastic rock, basalt, glass, maskelynite, and mineral debris in a fine-grained friable matrix.

Major-element composition:

Chemical analyses of 79035

SiO ₂	41.7
Al ₂ O ₃	12.26
FeO.....	16.51
MgO.....	9.91
CaO.....	11.2
Na ₂ O.....	.409
K ₂ O.....	.082
TiO ₂	7.99
P ₂ O ₅.....	.055
MnO.....	.217
Cr ₂ O ₃.....	.402
Total.....	100.735
79035,27 (Wanke and others, 1974).	

Sample 79115

Type: Sedimentary, impact-consolidated polymict breccia.
Size: 9.5x7.5x5 cm.
Weight: 346.3 g.
Location: Broken from boulder on southeast rim of Van Serg crater.

Illustrations: Pan 28; figures 226, 227 (LRL), 228 (photomicrograph).

Comments: Sample 79115 is impact-consolidated regolith material ejected from Van Serg crater.

Petrographic description: Polymict breccia with small clasts of metaclastic rock, basalt, glass (including orange glass spheres), maskelynite, and mineral debris in a fine-grained friable matrix.

Sample 79120-25

Type: Sedimentary, unconsolidated (79120-24) and small breccia fragment (79125).

Size: 79125, 2x1.2x1 cm.

Weight: 79120-24, 372.39 g; 79125,1.91 g.

Depth: From 0-3 cm.

Location: Southeast rim of Van Serg crater.

Illustrations: Pan 28; figure 226.

Comments: Van Serg ejecta.

Petrographic description: 79120-24, dominantly finegrained breccia and (or) metaclastic rock, some glass.

Sample 79135

Type: Sedimentary, impact-consolidated polymict breccia.

Size: 20x12x10 cm.

Weight: 2,283 g.

Location: From a breccia boulder on the southeast rim of Van Serg.

Illustrations: Pan 28, figures 226, 229 (LRL).

Comments: Sample 79135 is impact-consolidated regolith material ejected from Van Serg crater.

Petrographic description: Polymict breccia with Blasts of basalt, feldspathic metaclastic rock, glass (including orange glass spheres), and mineral debris in a finegrained moderately coherent matrix.

Major-element composition:

Chemical analyses of 79135

	1	2	3	4
SiO ₂	42.49	42.57	42.6	42.5
Al ₂ O ₃	15.08	14.74	13.83	14.55
FeO.....	14.01	15.19	14.97	14.72
MgO.....	10.42	9.10	10.81	10.11
CaO.....	11.44	10.91	11.1	11.2
Na ₂ O.....	.40	.40	.469	.42
K ₂ O.....	.10	.11	.098	.10
TiO ₂	5.15	6.33	5.42	5.63
P ₂ O ₅.....	.07	.09	.076	.08
MnO.....	.19	.19	.195	.19
Cr ₂ O ₃.....	.39	.45	.373	.40
Total	99.54	100.08	99.941	99.90

1. 79135,1 (Apollo 17 PET, 1973).
2. 79135,35 (Rose and others, 1974).
3. 79135,38 (Wanke and others, 1974).
4. Average of 1 - 3.

Sample 79155

Location: Southeast rim of Van Serg crater.

Illustrations: Pan 28; figure 230 (LRL).

Comments: Sample 79155 is a piece of impactbrecciated and impact-fused subfloor basalt. Its exposure age implies a long history as a regolith fragment

Type: Olivine basalt breccia with a glassy matrix.

Size: 8x6x5 cm.

Weight: 318.8 g.

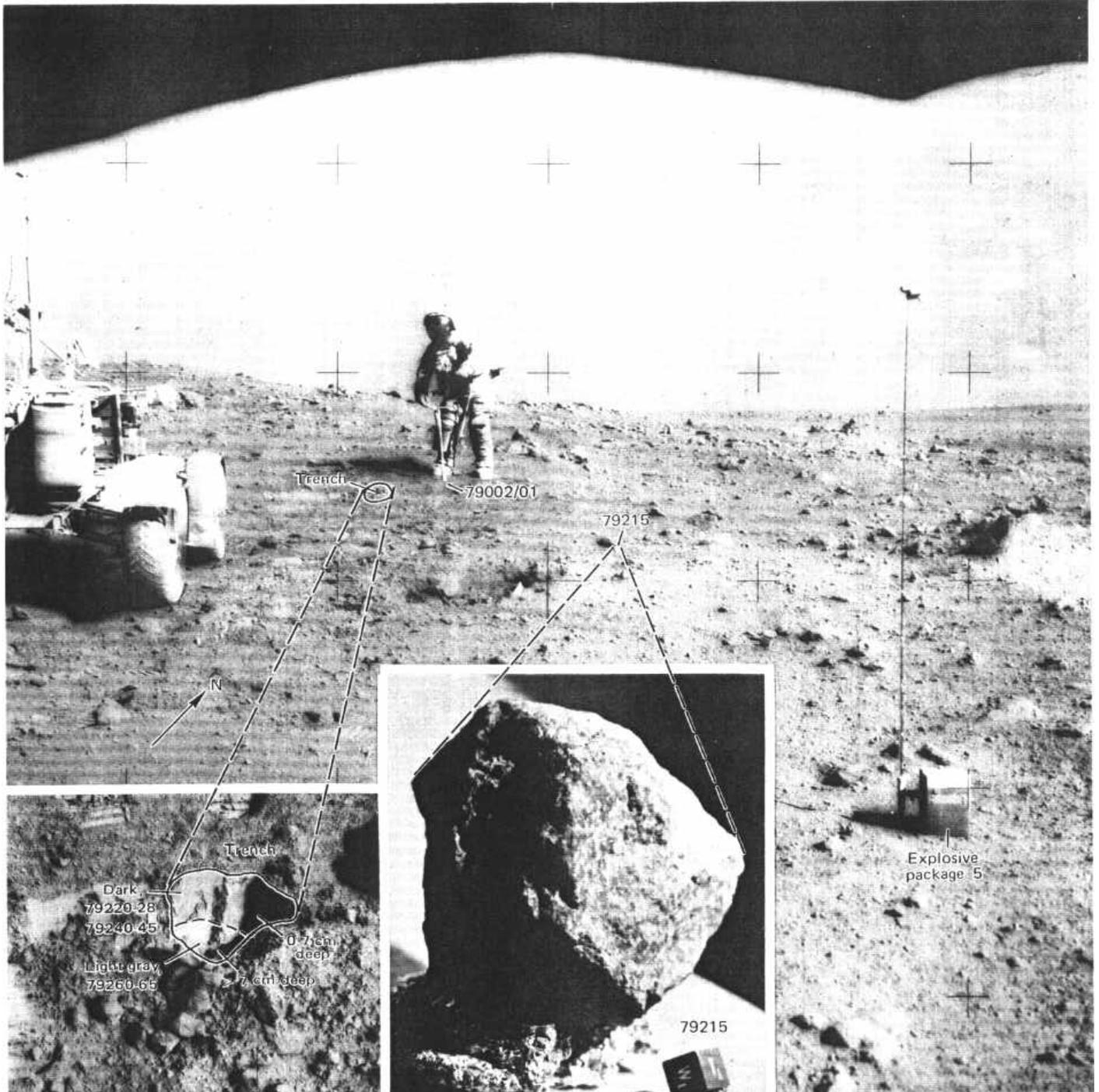


FIGURE 224.-Drive-tube sample 79002/79001, trench samples 79220-28, 79240-45, 79260-65, and rock sample 79215. Astronaut is collecting drive-tube sample. Insets show trench after sampling and rock sample 79215 with reconstructed lunar surface orientation and lighting. (NASA photographs AS 17-143-21837; AS 17-142-21827, trench closeup; S-73-19590.)

ment. It was probably part of the regolith material of the Van Serg target.

Petrographic description: Monomict breccia with clasts of medium-grained olivine basalt with subophitic (?) texture in a dark glass matrix.

Major-element composition:

Chemical analyses of 79155

	1	2	3
SiO ₂	37.50	39.13	38.32
Al ₂ O ₃	8.58	9.40	8.99
FeO.....	19.04	18.19	18.62
MgO.....	9.14	9.58	9.36
CaO.....	10.29	10.19	10.24
Na ₂ O.....	.38	.36	.37
K ₂ O.....	.06	.08	.07
TiO ₂	12.99	12.56	12.78
P ₂ O ₅.....	.05	.04	.04
MnO.....	.28	.27	.28
Cr ₂ O ₃.....	.46	.50	.48
Total	98.77	100.30	99.55

1. 79155,38 (Rhodes and others, 1976).
2. 79155,39 (Rose and others, 1975).
3. Average of 1 and 2.

Age: ⁴⁰⁻³⁹Ar: 79155,24, 3.80±0.04 b.y.; intermediate temperature plateau; age is considered an older limit for the basalt (Kirsten and Horn, 1974).

Exposure age: Ar: 79155,24, 575±60 m.y. (Kirsten and Horn, 1974).

Sample 79175

Type: Polymict breccia with a glassy matrix.

Size: 14x13x9 cm.

Weight: 677.7 g.

Location: Southeast rim of Van Serg crater.

Illustrations: Pan 28; figures 231, 232 (LRL), 233.

Comments: Sample 79175 is impact-fused regolith material from the Van Serg target.

Petrographic description: Polymict breccia with clasts of fine-grained polymict breccia, basalt, feldspathic metaclastic rocks, orange glass, and mineral debris in a glass matrix.

Sample 79195

Type: Sedimentary, weakly lithified polymict breccia.

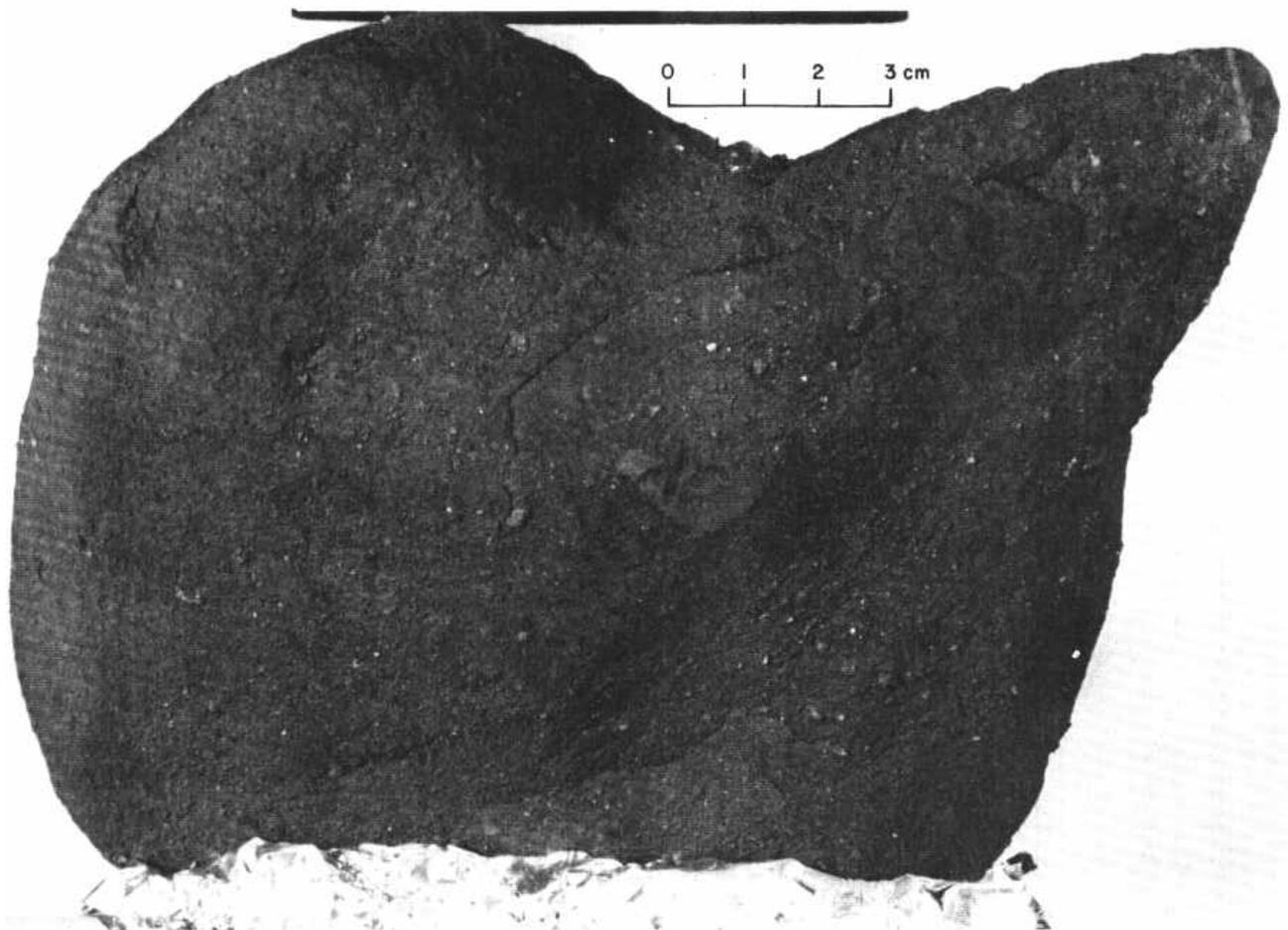


FIGURE 225.-Sample 79035,1. Weakly lithified polymict breccia. (NASA photograph S-73-15729.)

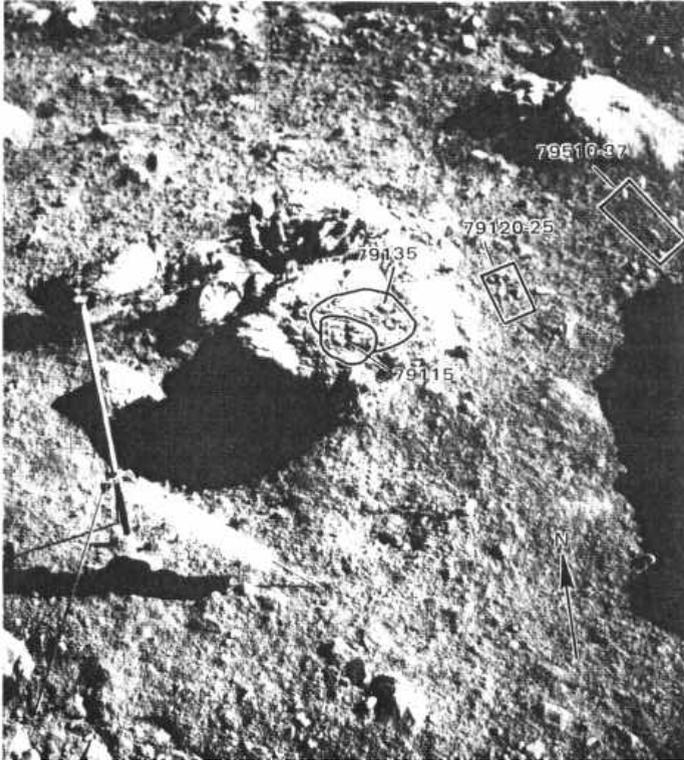


FIGURE 226.-Locations of samples 79115, 79120-25, 79135, and 7910-37 before collection. (NASA photograph AS 17-147 22413.)

Size: Four pieces, 9x6.5x5 cm, 7x5.5x4 cm, 2.5x2x1.5 cm, 1.5x1.5x1 cm.

Weight: 368.5 g total.

Location: Southeast rim of Van Serg crater.

Illustrations: Pan 28; figures 233, 234 (LRL).

Comments: Sample 79195 is weakly indurated regolith material ejected from Van Serg crater.

Petrographic description: Polymict breccia with clasts of basalt, metaclastic rocks or fine-grained breccia, and mineral debris in a fine-grained friable matrix.

Sample 79215

Type: Metatroctolite(?) breccia with a granoblastic matrix.

Size: 9x8x7.5 cm.

Weight: 553.8 g.

Location: About 5 m northeast of the LRV.

Illustrations: Pans 28, 29; figures 224, 235 (photomicrograph).

Continents: Sample 79215 is a highlands rock that may have been a regolith fragment in the Van Serg target.

Petrographic description: Metatroctolite(?) breccia. Porphyroclasts, dominantly plagioclase and olivine, and relict lithic clasts of metatroctolite (?) with granoblastic to granoblastic-polygonal texture in a fine-grained granoblastic matrix.

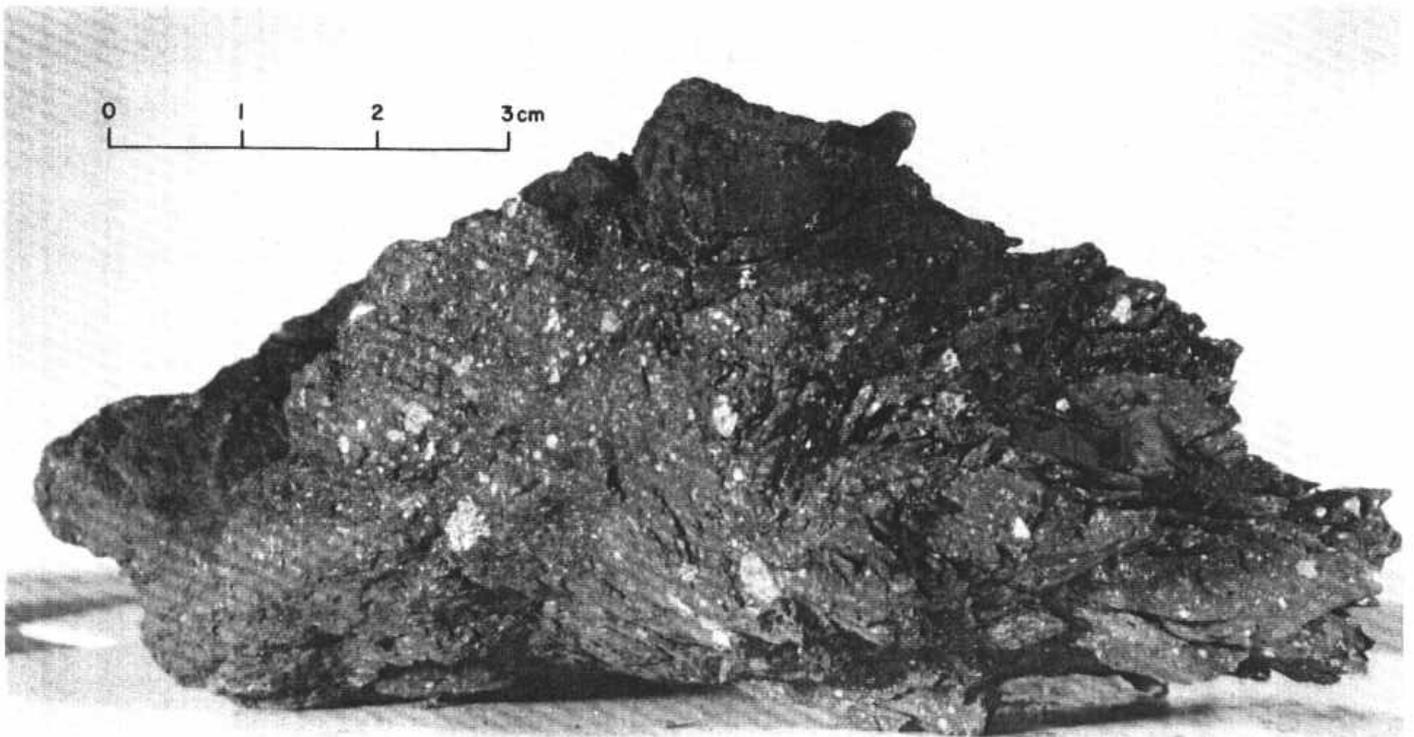


FIGURE 227.-Sample 79115. Impact - consolidated polymict breccia with distinctive fracture pattern. (NASA photograph S-73-15398.)

Bickel and others (1976b) interpreted sample 79215 as a derivative of a plagioclase-olivine cumulate rock that was crushed and finely mixed by meteorite impact and subsequently more intensely annealed than were most lunar breccias.

Major-element composition:

Chemical analyses of 79215

SiO ₂	43.8
Al ₂ O ₃	27.7
FeO.....	4.6
MgO.....	6.3
CaO.....	15.9
Na ₂ O.....	.5
K ₂ O.....	.1
TiO ₂.....	.3
P ₂ O ₅.....	.4
MnO.....	.06
Cr ₂ O ₃.....	.2
<hr/>	
Total.....	99.86

79215, whole rock composition calculated from micro probe counts (Bickel and others, 1976a).

Exposure age: Tracks: 79215,75, 3.7 m.y. (Bhandari and others, 1976) .

Sample 79220-28

Sample Type: Sedimentary, unconsolidated (79220-24) and sedimentary, weakly lithified polymict breccias (79225-28).

Size: 79225, 3.5x2x1 cm, is the largest.

Weight: 79220-24, 269.3 g; 79225, 7.42 g; 79226, 6.73 g; 79227 , 5.57 g; 79228, 2.5 g.

Depth: From 0 to 2 cm in trench.

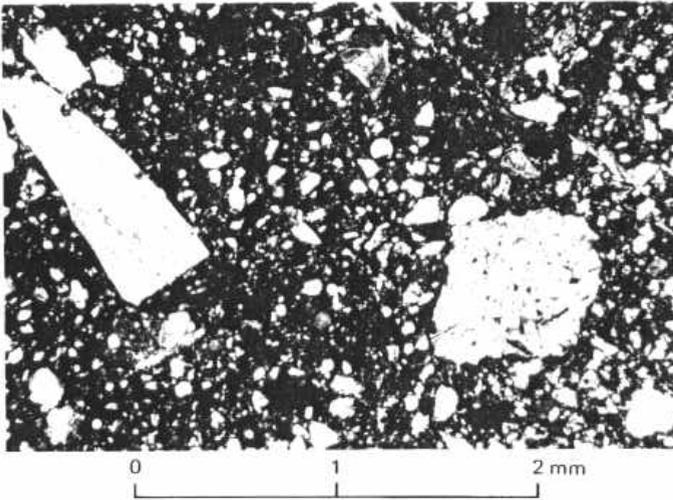


FIGURE 228.-Sample 79115. Photomicrograph showing mineral and lithic debris in very fine grained matrix that has been impact consolidated.

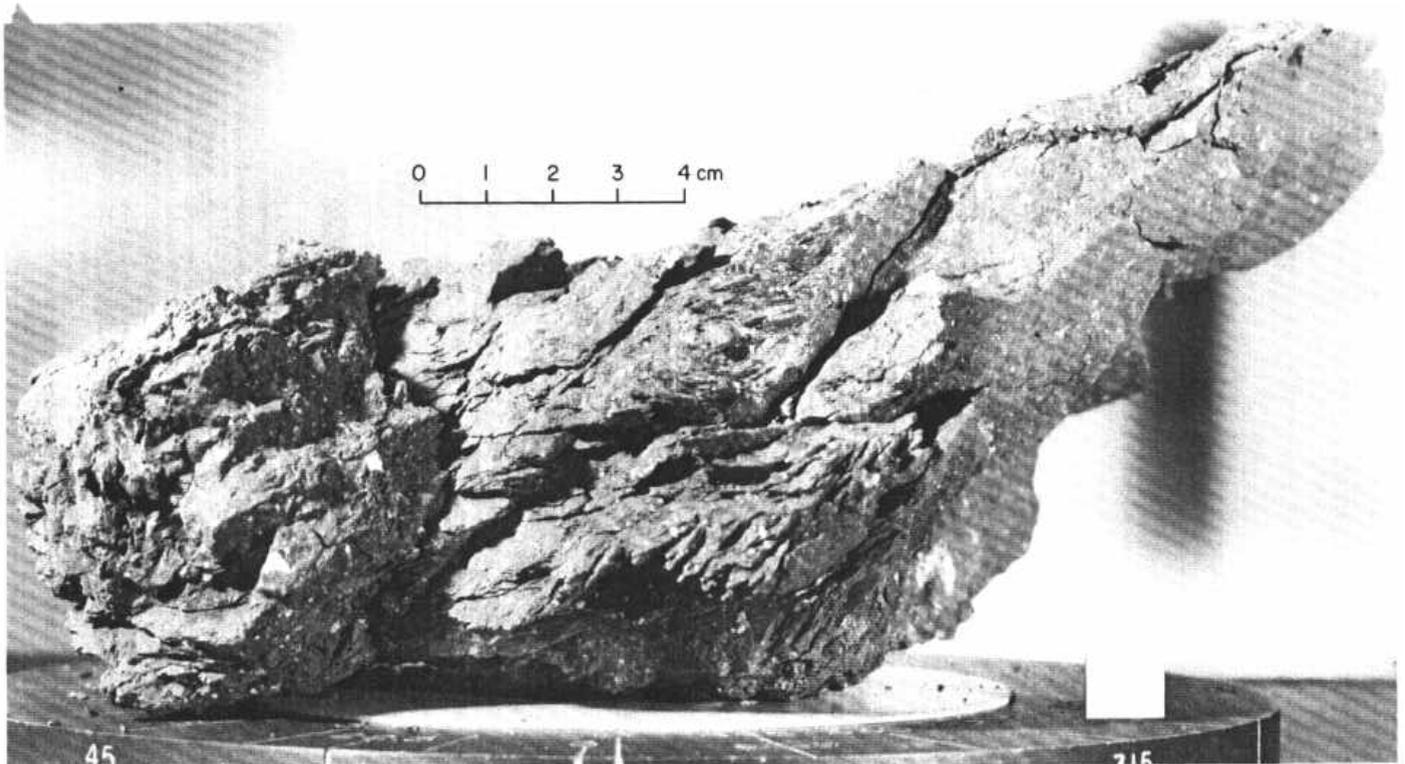


FIGURE 229.-Sample 79135. Impact-consolidated polymict breccia with distinctive fracture pattern. (NASA photograph S-73-15447.)

Location: About 65 m southeast of the Van Serg crater rim crest.

Illustrations: Pans 28, 29; figure 224.

Comments: Sample 79220-25 is from the upper dark unit exposed in the trench. The material is probably ejecta from Van Serg crater.

Petrographic descriptions:

79220-24, dominantly fine-grained breccia and (or) metaclastic rock, some glass, basalt.

Components of .90-150-um fraction of 79221,2 (Heiken and McKav, 1974)

Components	Volume Percent
Agglutinate.....	44.4
Basalt, equigranular.....	14.4
Basalt, variolitic	14.4
Breccia:	
Low grade ¹ - brown.....	8.5
Low grade ¹ - colorless.....	1.0
Medium to high grade ²	1.0
Anorthosite.....	--
Cataclastic anorthosite ³.....	.03
Norite.....	--
Gabbro.....	--
Plagioclase.....	6.9
Clinopyroxene.....	6.5
Orthopyroxene.....	--
Olivine.....	--
Ilmenite.....	1.3
Glass:	
Orange.....	4.2
"Black".....	3.3
Colorless.....	2.3
Brown.....	2.3
Gray, "ropy".....	3.6
Other.....	--
Total number of grains.....	306

1. Metamorphic groups 1-3 of Warner (1972).
2. Metamorphic groups 4-8 of Warner (1972).
3. Includes crushed or shocked feldspar grains.

79225-27, polymict breccia with very small lithic and mineral clast in a fine-grained friable matrix.

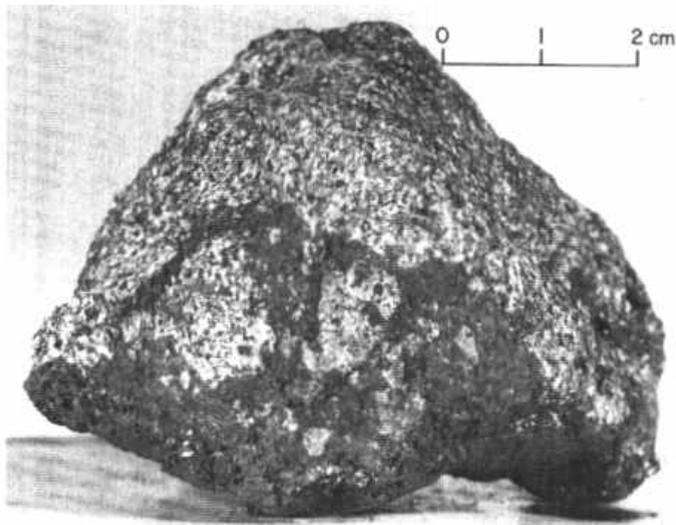


FIGURE 230.-Sample 79155. Monomict breccia with clasts of olivine basalt in glassy matrix. (NASA photograph S-73-15321.)

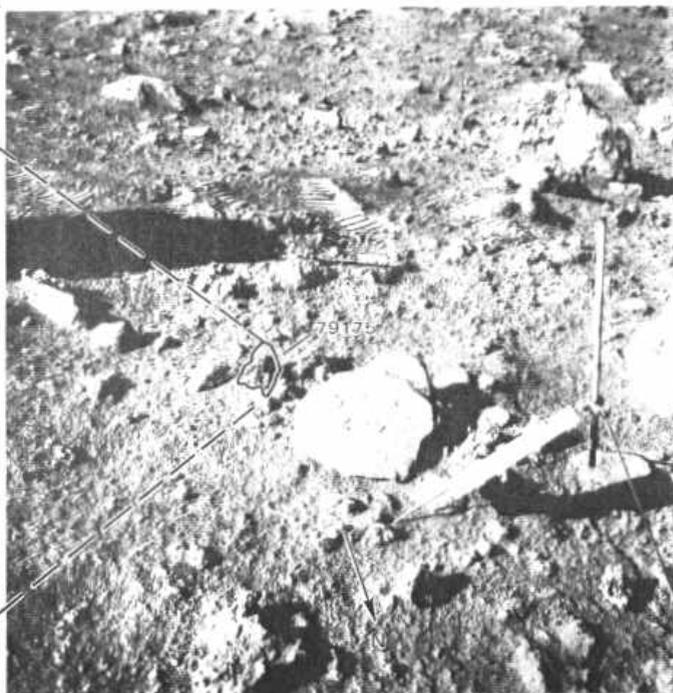
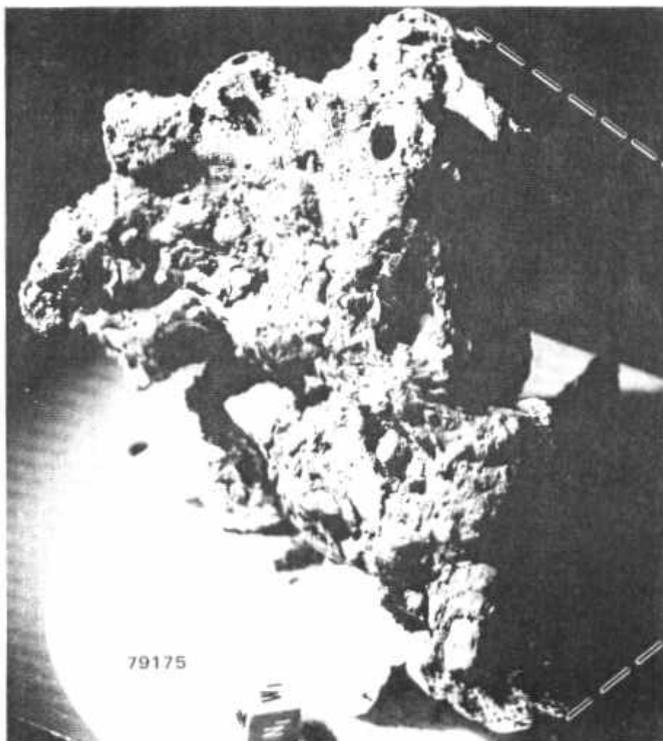


FIGURE 231.-Left, Sample 79175 with reconstructed lunar surface orientation and lighting. (View similar to NASA photograph S73-19594.) Right, Sample 79175 before collection. (NASA photograph AS17-1413-22430.)

Major-element composition:

Chemical analyses of 79221

	1	2	3
SiO ₂	41.67	41.63	41.65
Al ₂ O ₃	13.57	13.48	13.52
FeO.....	15.37	15.43	15.40
MgO.....	10.22	10.30	10.26
CaO.....	11.18	11.19	11.18
Na ₂ O.....	.34	.35	.34
K ₂ O.....	.09	.11	.10
TiO ₂	6.52	6.48	6.50
P ₂ O ₅.....	.06	.08	.07
MnO.....	.21	.20	.20
Cr ₂ O ₃.....	.42	.44	.43
Total	99.65	99.69	99.65

1. 79221.2 (Apollo 17 PET, 1973).
2. 79221.30 (Rose and others, 1974).
3. Average of 1 and 2.

Exposure age:

²²Na-²⁶Al: minimum 1.4±0.6 m.y.; maximum

1.7±0.8 m.y. (Yokoyama and others, 1976).

Minimum track density: 11 m.y. for 2-cm layer at

surface in station 9 trench (Fleischer and Hart, 1974).

Sample 79240-45

Type: Sedimentary, unconsolidated (79240-44) and troctolite (?) breccia with an aphanitic matrix (79245).

Size: 79245, 3.2x2x1.5 cm.

Weight: 79240-44, 320.23 g; 79245, 10.11 g.

Depth: From 2 to 7 cm in trench.

Location: 65 m southeast of Van Serg crater rim crest.

Illustrations: Pans 28, 29; figure 224.

Comments: Sample, from the upper dark unit in the trench, is probably Van Serg ejecta. Sample 79245 is a fragment of highlands breccia that presumably was in the regolith in the Van Serg target.

Petrographic descriptions: 79240-44, dominantly fine-grained breccia and (or) metaclastic rock, basalt, some glass. 79245, metatroctolite (?). Plagioclase and olivine porphyroclasts in an aphanitic matrix.

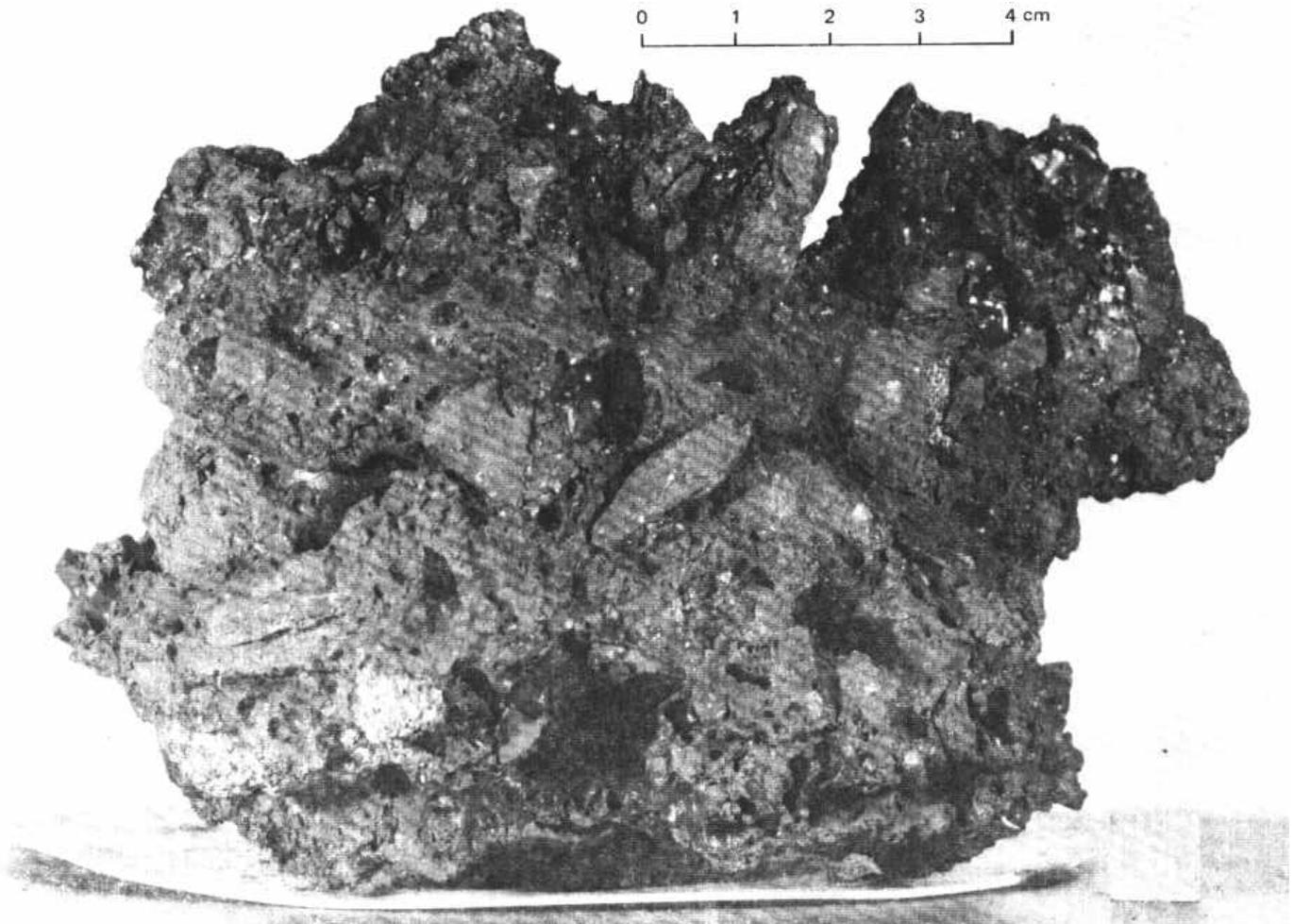
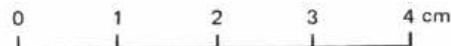


FIGURE 232.- Sample 79175. Polymict breccia with glassy matrix (NASA photograph S-73-17782.)

Major-element composition:

Chemical analyses of 79241

SiO ₂	41.73
Al ₂ O ₃	13.90
FeO.....	15.64
MgO.....	9.90
CaO.....	11.08
Na ₂ O.....	.39
K ₂ O.....	.09
TiO ₂	6.79
P ₂ O ₅.....	.08
MnO.....	.20
Cr ₂ O ₃.....	.46
Total.....	100.26

79241,28 (Rose and others, 1974).

Exposure age:

Minimum track density: Assuming that this sample represents a layer from 2 to 7 cm in depth that was deposited earlier than a layer from 0 to 2 cm (sample 79220-28), Fleischer and Hart (1974) calculated a surface exposure time of 8 m.y. and a total exposure time of 19 m.y. for 79241. However, there is no evidence to support the assumption that material from 2 to 7 cm in the trench was deposited at an earlier time than the material from 0 to 2 cm.

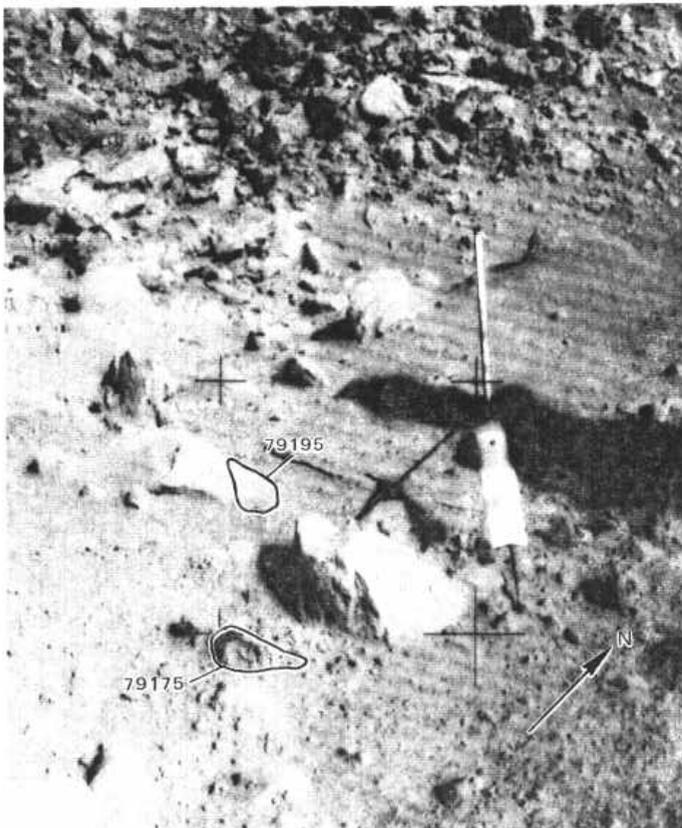


FIGURE 233.-Samples 79175 and 79195 before collection. (NASA photograph AS17-142-21795.)

Sample 79260-65

Type: Sedimentary, unconsolidated (79260-64) and basalt (79265).
 Size: 79265, 1.3x1x1 cm.
 Weight: 79260-64, 345.75 g; 79265, 2.6 g.
 Depth: From 7 to 17 cm in trench.
 Location: About 65 m southeast of Van Serg crater rim crest.
 Illustrations: Pans 28, 29; figure 224.
 Comments: Sample 79260-64, from lower light-gray unit exposed in trench, is probably ejecta from Van Serg crater. Sample 79265 is a subfloor basalt fragment that was in the regolith of the Van Serg target.
 Petrographic description: 79260-64, dominantly basalt and fine-grained breccia and (or) metaclastic rock, some glass.

Components of 90-150-um fraction of 79261,1 Weiken and McKay, 1974)

Components	Volume Percent
Agglutinate.....	22.3
Basalt, equigranular.....	13.3
Basalt, variolitic.....	13.3
Breccia:	
Low grade ¹ - brown.....	1.3
Low grade ¹ - colorless.....	.3
Medium to high grade ²	8.3
Anorthosite.....	.6
Cataclastic anorthosite ³.....	.6
Norite.....	.3
Gabbro.....	--
Plagioclase.....	12.7
Clinopyroxene.....	16.6
Orthopyroxene.....	1.6
Olivine.....	--
Ilmenite.....	7.0
Glass:	
Orange.....	4.0
"Black".....	2.6
Colorless.....	3.2
Brown.....	2.0
Gray, "ropy".....	1.3
Other.....	1.6
Total number of grains.....	300

1. Metamorphic groups 1-3 of Warner (1972).
2. Metamorphic groups 4-8 of Warner (1972).
3. Includes crushed or shocked feldspar grains.

Major-element composition:

Chemical analyses of 79261

	1	2	3
SiO ₂	42.26	42.58	42.42
Al ₂ O ₃	14.43	14.51	14.47
FeO.....	14.60	14.69	14.64
MgO.....	9.82	9.67	9.74
CaO.....	11.48	11.35	11.42
Na ₂ O.....	.35	.39	.37
K ₂ O.....	.11	.10	.10
TiO ₂	6.09	6.28	6.18
P ₂ O ₅.....	.07	.08	.08
MnO.....	.20	.19	.20
Cr ₂ O ₃.....	.40	.41	.40
Total	99.81	100.25	100.02

1. 79261,2, 12 (Apollo 17 PET, 1973).
2. 79261,29 (Rose and others, 1974).
3. Average of 1 and 2.

Exposure age:

^{22}Na - ^{26}Al : maximum 1.6±0.6 m.y. (Yokohama and others, 1976).

Minimum track density: Assuming that the three trench samples, from depths of 0 to 2 cm, 2 to 7 cm, and 7 to 17 cm, represent three distinct depositional events decreasing upward in age, Fleischer and Hart (1974) calculated a 5 m.y. exposure time for the lowest layer (79261) and a burial time of 19 m.y. to give a total age of 24 m.y. for 79261.

As noted for sample 79240-45, there is no evidence to support the assumption that the interval from 0 to 7 cm in the trench represents more than one depositional unit. The boundary at 7 cm could be, but is not necessarily, a contact between separate depositional units. Such units might be Van Serg ejecta (lower, lightgray unit) and overlying younger ejecta (upper, dark unit) from local impacts on the Van Serg ejecta blanket.

Sample 79510-19, 25-29, 35-37

Type: Sedimentary, unconsolidated (79510-14); olivine

basalt (79515-16); sedimentary, weakly lithified polymict breccia (79517-18); and nine small fragments of probable weakly lithified polymict breccia (79519, 25-29, 35-37).

Size: Largest fragment, 79515, 4x3.5x3 cm.

Weight: 79510-14, 320.3 g; 79515, 33 g; 79516-19, 25-29, 35-37, 60.23 g.

Depth: From upper few centimeters.

Location: From southeast rim of Van Serg crater.

Illustrations: Pan 28; figure 226.

Comments: Sample is Van Serg ejecta. Basalt samples 79515-16 are subfloor basalt fragments from the regolith in the Van Serg target. Weakly lithified polymict breccia fragments are samples of indurated regolith from the Van Serg target.

Petrographic descriptions:

79510-14, dominantly fine-grained breccia and (or) metaclastic rock, some glass, agglutinate.

70515, medium-grained vesicular olivine basalt.

79516, fine-grained olivine basalt.

79517, 18, polymict breccia with small clasts of basalt, metaclastic (?) rock, and mineral debris in a fine-grained friable matrix.

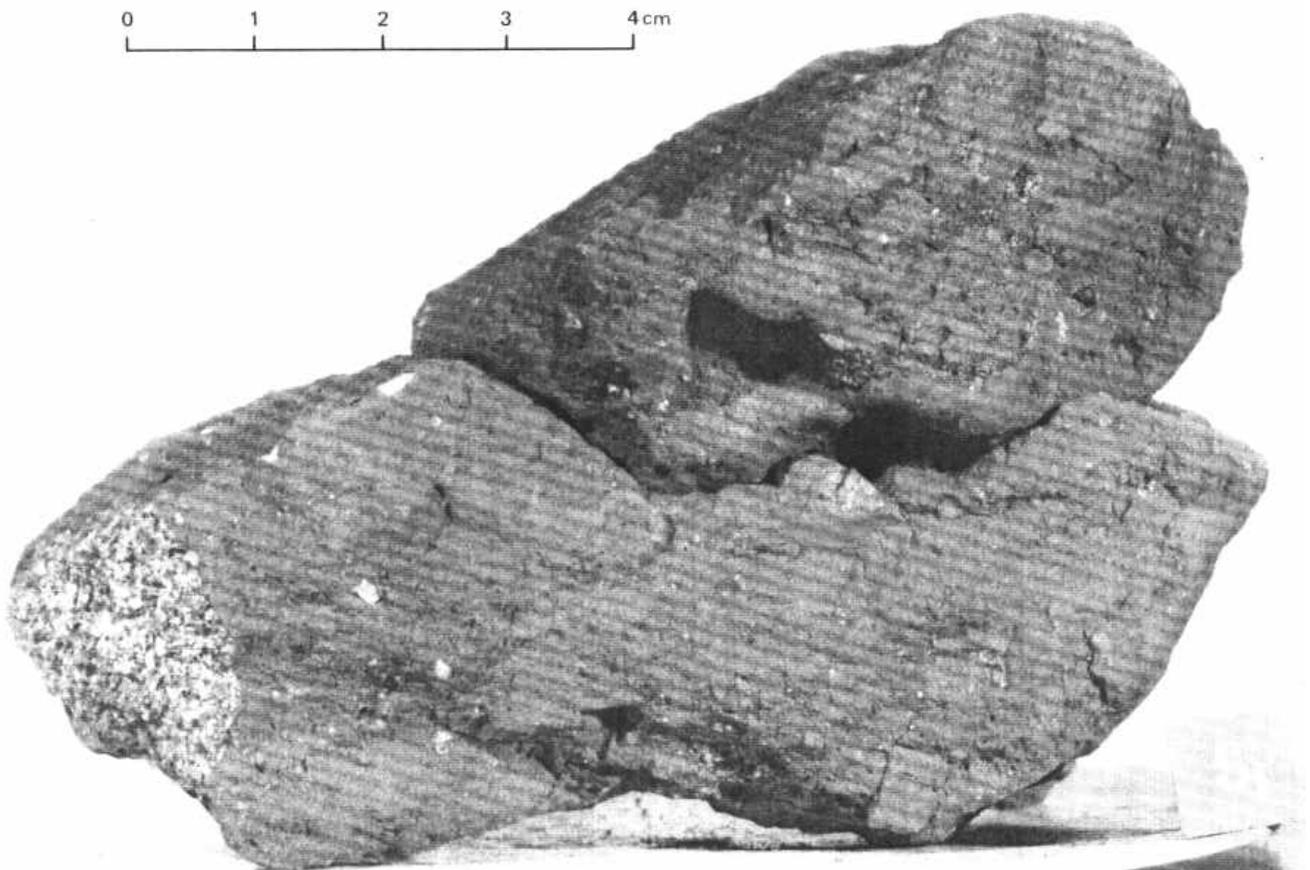


FIGURE 234.- Sample 79195. Weakly lithified polymict breccia. Large clast at left is mare basalt. (NASA photograph S-73-17788.)

Major-element composition:

Chemical analyses of 79511

SiO ₂	41.69
Al ₂ O ₃	13.79
FeO.....	15.11
MgO.....	10.31
CaO.....	10.73
Na ₂ O.....	.27
K ₂ O.....	.18
TiO ₂	6.13
P ₂ O ₅.....	.06
MnO.....	.27
Cr ₂ O ₃.....	.43
<hr/>	
Total.....	99.87
<hr/>	
79511 (Mason and others, 1974).	

STATION LRV-12

LOCATION

Station LRV-12 is located approximately 200 m north-northwest of the north rim of Sherlock crater (fig. 7E).

OBJECTIVES

The original plan called for a traverse station, 10B, at Sherlock Crater (fig. 5). Sampling stop LRV-12 was substituted on the return to the LM from station 9 when station 10B was cancelled due to the shortage of time.

GENERAL OBSERVATIONS

The surface in the station area is flat to gently rolling, blocky, and locally cratered (fig. 236). Rocks cover about 5 percent of the surface and reach 1 m in size. The larger boulders, most of which are partly buried, are smooth with subrounded to rounded shapes. Smaller fragments range from partially buried to perched

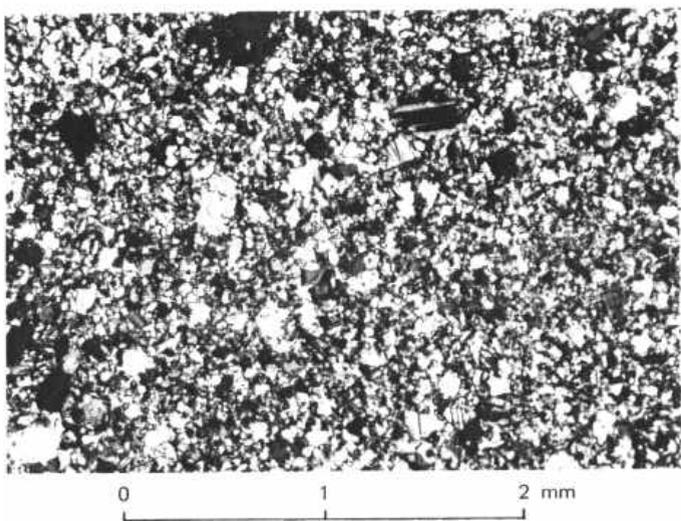


FIGURE 235.-Sample 79215. Photomicrograph showing metatroctolite breccia consisting of moderately abundant plagioclase and olivine porphyroclasts in granoblastic matrix. Crossed polarizers.

on the surface. Most are rounded, but a few are subangular with planar sides.

Local craters (ire up to about 10 m in diameter. Some have excavated abundant rock fragments, presumably from the ejecta of Sherlock crater. Smaller craters, about 1 m in diameter, are rimmed with clods.

Two samples, sediment and a loose rock from the surface, were collected at station LRV-12.

SUMMARY OF SAMPLING

Sample 70311-15

Type: Sedimentary, unconsolidated (70311-14) and basalt (70315).

Size: 70315, 5x4.5x4.5 cm.

Weight: 70311-14, 119.16 g; 70315, 148.6 g. *Depth:*

From upper few centimeters.

Location: About 200 m north-northwest of Sherlock crater.

Illustrations: Figures 236, 237 (LRL).

Comments: Sample 70315, subfloor basalt, is probably part of the Sherlock crater ejecta. Sediment (70311-14) was scooped with the basalt sample.

Petrographic descriptions:

70311-14, dominantly basalt and breccia fragments, with some glass and agglutinates.

70315, medium-grained porphyritic vesicular basalt. Aggregates of clinopyroxene-ilmenite in a locally plumose groundmass of plagioclase, clinopyroxene, ilmenite, and accessory minerals.

Sample 70320-24

Type: Sedimentary, unconsolidated.

Weight: 233.36 g.

Depth: From upper few centimeters.



FIGURE 236.-Probable location of samples 70311-15 and 70320-24 at LRV-12. (NASA photograph AS17-143-21893.)